Invasive Shot-Hole Borers + Fusarium Dieback
Identifying Symptoms and Look-Alike Pests

BACKGROUND

Adult female (Photo credit: Gevork Arakelian/LA County Dept of Agriculture)

Invasive Shot-Hole Borers (ISHB), *Euwallacea* spp., are invasive beetles that attack dozens of common native and landscape trees. The tiny insects tunnel into host trees and spread Fusarium Dieback (FD), a disease known to infect over 260 tree species. FD is caused by species of *Fusarium* fungi that disrupt the transport of water and nutrients in the tree, leading to branch dieback and overall decline. ISHB refers to two closely related, physically identical beetles: the **Polyphagous** (PSHB) and **Kuroshio Shot-Hole Borer** (KSHB). ISHB has been detected in Los Angeles, Orange, San Diego, Riverside, San Bernardino, Ventura, Santa Barbara, and San Luis Obispo Counties.

HOSTS

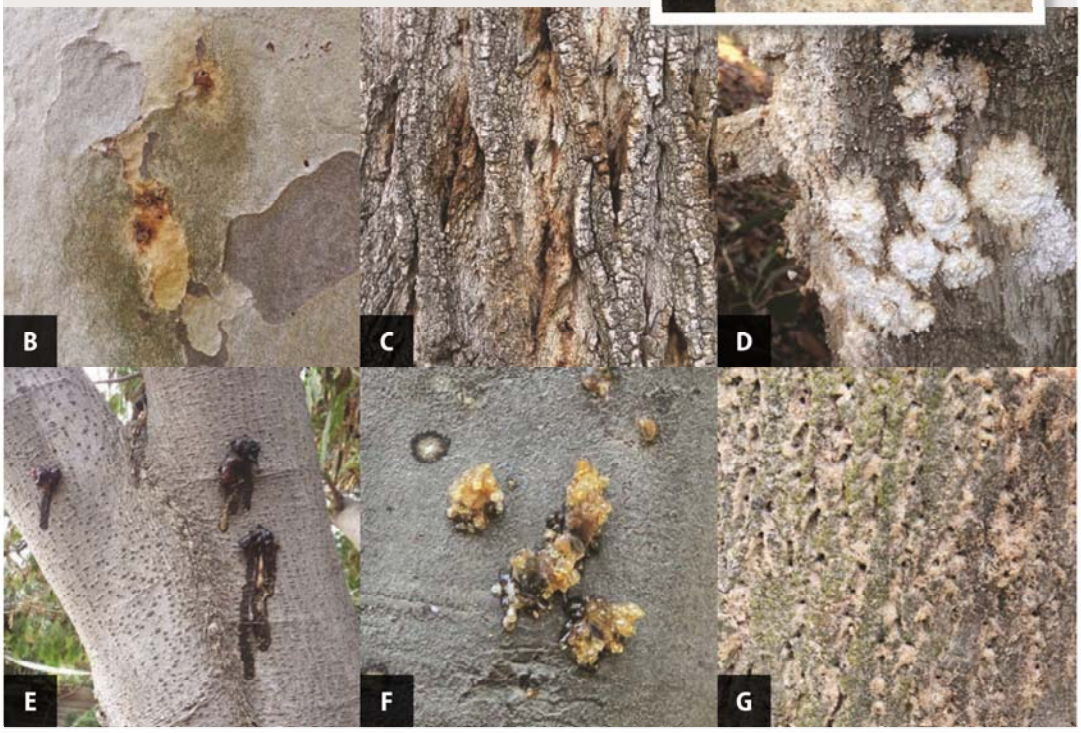
ISHB can reproduce and grow *Fusarium* in at least 50 known species, called reproductive hosts. Relative susceptibility among these species is dynamic and varied. Some of the more susceptible reproductive hosts appear to be box elder, avocado, coral, white alder, castor bean, valley oak, Engelmann oak, and several species of sycamore, cottonwood, and willow.

See the full list of known reproductive hosts at www.pshb.org.

EXTERNAL SIGNS + SYMPTOMS

Attack symptoms, a host tree's visible response to stress, vary by host species. Look for the beetle's entry-holes (A), which are ~0.85 mm in diameter, accompanied by staining (B, C), sugary exudate (D), gumming (E, F), and/or frass (G). The symptoms may be noticeable before the beetles—at 1.8-2.5 mm long, females are smaller than a sesame seed. The abdomen of the female beetle can sometimes be seen sticking out of the hole.

Species below: B. California sycamore, C. Fremont cottonwood, D. Avocado, E. Mimosa/Silk tree, F. Titoki, G. Box elder



INTERNAL DAMAGE

Beneath the bark, *Fusarium* causes dark discoloration of wood in and around the beetle galleries (H, I). Advanced infections lead to branch dieback (J) and tree mortality.

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ISHB-FD LOOK-ALIKES

Western oak bark beetle + Foamy bark canker disease

HOST TREES:	Stressed coast live oak, tanoak, CA buckeye
BEETLE SIZE:	1.7-2.3 mm long
ENTRY-HOLE:	Smaller than ISHB
SYMPTOMS:	Reddish frass/sap; disease causes wet discoloration and/or foamy liquid from entry-hole

Fruit tree shot-hole borer, *Scolytus rugulosus*

HOST TREES:	Fruit and nut trees (e.g. stone fruits, apples, almonds), English laurel
BEETLE SIZE:	2-2.5 mm long
ENTRY-HOLE:	Larger than ISHB
SYMPTOMS:	Entry-hole oozes sap or frass; exit-holes are sap-free

Oak ambrosia beetles, common species: *Monarthrum scutellare*

HOST TREES:	Stressed or dying oaks, tanbark oaks, CA buckeye
BEETLE SIZE:	3.5-4.1 mm long
ENTRY-HOLE:	Larger than ISHB
SYMPTOMS:	Bleeding, frothing, white boring dust from entry-hole

Secondary ambrosia beetle, *Xyleborinus saxeseni*

HOST TREES:	Dying or stressed trees
BEETLE SIZE:	2-2.4 mm long
ENTRY-HOLE:	Smaller than ISHB
SYMPTOMS:	Reddish frass and/or sap; wet staining and/or dead tissue around entry-hole

Bacterial canker, *Xanthomonas campestris*

HOST TREES:	Avocado
BEETLE SIZE:	N/A (Bacteria)
ENTRY-HOLE:	Cavity; no hole
SYMPTOMS:	White, sugary exudate and bleeding from cavity in the bark

Photo credit: (A) (C) (E) Jack K. Clark/ UC IPM <ipm.ucanr.edu>. (F) Pavel Svihra/ UC Regents. (G) Christoph Benisch <kerbtier.de>.

ISHB RESOURCES

Stay up to date on the latest ISHB-Fusarium Dieback research and news:
www.pshb.org - Invasive Shot-Hole Borer, UC Cooperative Extension central website
www.eskalenlab.ucr.edu - Eskalen Lab, UC Riverside
www.ipm.ucanr.edu - UC Statewide IPM Program (for information on look-alike pests)

REPORTING SUSPECTED ISHB

Please visit www.pshb.org for current reporting information.

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